

DOCUMENT RESUME

ED 314 572

CE 053 162

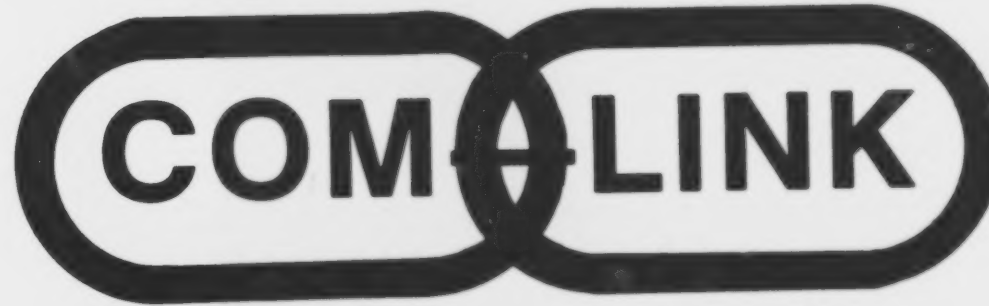
AUTHOR Felice, Michael
TITLE Recreational Vehicle Maintenance and Repair.
COM-LINK. Competency Based Vocational Curricula with
Basic Skills and Academic Linkages.
INSTITUTION Ocean County Vocational Technical School, Toms River,
N.J.
SPONS AGENCY New Jersey State Dept. of Education, Trenton. Div. of
Vocational Education.
PUB DATE Jul 89
NOTE 95p.; For related documents, see CE 053 146-174.
Small, light type may not reproduce clearly.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS Academic Education; *Auto Mechanics; Basic Skills;
Communication Skills; *Competency Based Education;
*Engines; Integrated Curriculum; Mathematics Skills;
Motor Vehicles; *Repair; Science Instruction;
Secondary Education; Vocational Education; Welding
IDENTIFIERS *Recreational Vehicles

ABSTRACT

This competency-based module uses the Ocean County (New Jersey) Vocational-Technical Schools curriculum-infused model for infusing basic skills instruction into vocational education. The model demonstrates the relationship of vocational skills to communication, mathematics, and science. The document begins with a philosophy statement; preface; a table that explains the number of hours required for academic credit in various programs and the number of those hours that are devoted to basic skills and vocational activities; matrices that show in which courses specific basic skills are taught; a list of objectives; and an explanation of student activities. The rest of the document consists of matrices that describe the relationship of vocational skills to basic skills within the recreational vehicle maintenance and repair program. These pages are organized by instructional unit and the topics within them. For each topic and associated task(s) are listed the theories and the communication, math, and science skills covered. Also listed are the expected student outcomes. The 28 units are: orientation; tools; fasteners; measurement; shop manuals; the engine; crankshaft and bearings; pistons and connecting rods; valves and valve train; lubrication system; fuel system; cooling system; gasoline; electrical system; battery; starting system; charging system; ignition system; drive train; drive line; differentials; suspension; steering systems; brake system; tires and wheels; heating and air conditioning; emission controls; and welding. (KC)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

Competency Based Vocational Curricula



With Basic Skills And Academic Linkages

Dr. Frederick Felice, Project Director

Marilyn Halprin, Co Project Director (Project Coordinator)

In Cooperation With The

New Jersey State Department of Education

Division of Vocational Education

And

Ocean County Vocational-Technical School

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)

☒ This document has been reproduced as
received from the person or organization
originating it.
☐ Minor changes have been made to improve
reproduction quality.

• Points of view or opinions stated in this docu-
ment do not necessarily represent official
OERI position or policy.

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

M. Halprin

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC)."

"It is the policy of the Ocean County Vocational-Technical School not to discriminate in its technical programs, activities, employment practices, or admission policies and practices on the basis of race, color, or national origin, sex or handicap. Lack of English language skills will not be a deterrent to admission to any program at the Ocean County Vocational-Technical School."

Ocean County Vocational-Technical School

Recreational Vehical Maintenance and Repair

Prepared by

Michael Felice, Instructor

Project Director

Frederick Felice, Ed. D., Assistant Superintendent

Project Coordinator and Editor

Marilyn Halprin, Supervisor of Basic Studies

Assistant Editor and Typist

Laura Vassallo

Administrative Offices

137 Bey Lea Road

Toms River, New Jersey 08753

William G. Henry, Superintendent

In cooperation with

the New Jersey Department of Education

Division of Vocational Education, Trenton, New Jersey 08625

PHILOSOPHY OF EDUCATION

The Ocean County Vocational-Technical Education Program should consist of those courses, activities and experiences which are designed to prepare students for a successful entrance in a given field of work. The program should be based upon an analysis of the worker needs of the field of work, the opportunities and requirements for entrance, and the particular characteristics and needs of the students.

We believe that:

The school should educate and train the students to live effectively in our ever-changing world.

The school should provide, for each student, intensive training toward general and specific job objectives, and setting standards of performance in keeping with the requirements of that particular field of work.

All students should evidence the interest, aptitude, and ability to profit from the specialized instruction, and this should be a condition of entrance into or continuance in a given field of work.

Equal attention should be given in the school program to develop sound character, good citizenship, ability to think critically, and maintain good mental and physical health.

The school must be constantly striving to fulfill its ultimate purpose; that of serving the students and the community. The school should give careful consideration to the needs, interests, and capacities of the students and the educational and technical background, experience, training, and professional interest of the professional staff as they develop a working philosophy of education.

PREFACE

The curriculum format employed by this project is competency based and utilizes the Ocean County Vocational-Technical Schools' curriculum infused model for the teaching of basic skills as part of vocational education. The design demonstrates the relationship of vocationally related skills to communication, mathematics and science knowledge. Proficiencies with regard to student outcomes cannot be achieved without mastery in related academic areas. All student outcome objectives are predicated upon entry level skills which reflect the dictates of the job marketplace and industry. In addition, basic skills matrices developed by the district are included. The totality of this package is designed to facilitate the vocational teaching process and to enhance the learning experiences of our students.

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
 900 hours - 2 year course at O.C.V.T.S.
 1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
 60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
AIR CONDITIONING, REFRIGERATION AND HEATING	900	140	120	120	520
AUTO BODY REPAIR	900	130	120	125	525
AUTOMOTIVE MECHANICS	900	150	120	120	510
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	900	216	126	125	433
BEAUTY CULTURE I AND II	1000	240	120	130	515
BUILDING TRADES	900	135	120	130	515
BUSINESS RELATIONS - MEDIA/MODELING	450	200	60	40	150
CHILD CARE AIDE	900	240	120	122	418
COMMERCIAL ART AND PRINTING	900	120	215	75	580
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	900	130	125	130	515

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
 900 hours - 2 year course at O.C.V.T.S.
 1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
 60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
COMMERCIAL PHOTOGRAPHY & TELEVISION PRODUCTION	900	150	125	80	545
CUSTOM CABINETMAKING	900	130	120	60	590
DENTAL ASSISTING	450	168	65	77	140
DESIGN DRAFTING	900	135	150	165	450
ELECTRICAL TRADES	900	106	120	124	550
FASHION MERCHANDISING	450	200	60	40	150
FOOD SERVICES	900	206	132	125	437
INDUSTRIAL AUTOMATION AND ELECTRONICS	900	129	140	132	499
INTERIOR DESIGN	900	210	130	120	440
LANDSCAPING AND GREENHOUSE TECHNOLOGY	900	125	125	175	475

POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS FOR STUDENTS AT OCEAN COUNTY VOCATIONAL-TECHNICAL SCHOOL

450 hours - 1 year course at O.C.V.T.S.
 900 hours - 2 year course at O.C.V.T.S.
 1000 hours - 2 year Beauty Culture course

120 hours per year needed for 5 credits
 60 hours per year needed for 2½ credits

COURSE	TOTAL HOURS	HOURS SPENT ON COMMUNICATION SKILLS	HOURS SPENT ON COMPUTATION SKILLS	HOURS SPENT ON SCIENCE	TIME ON OCCUPATIONAL ACTIVITIES IN CLASS OR SHOP
MARINE ENGINE AND BOAT SERVICES	900	164	120	125	491
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	450	173	60	77	140
MEDICAL SKILLS AND RELATED HEALTH CAREERS	450	135	65	125	125
MEDICAL SKILLS (ADVANCED)	450	125	60	125	140
PLUMBING AND HEATING	900	140	120	120	520
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	900	125	130	60	585
T.V. AND COMPUTER REPAIR	900	125	150	175	450
WELDING	900	135	120	100	545

COMMUNICATION SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School.
The asterisk indicates that the topic is studied in that curriculum.

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*	*	*	*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
CHILD CARE AIDE	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*		*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*

COMMUNICATION SKILLS - CONTINUED

COURSE	Functional Reading Skills	Vocabulary	Identifying Main Ideas	Meanings in Context	Inferences	Fact/Opinion Distinction	Signal Words	Parts of Text-book/Manual	Following Directions	Outlining and Note Taking	Interpretation of Maps, Graphs and Charts	Interpretation of Diagrams	Test Taking Skills	Expository Writing Skills	Problem Solving	Spelling	Oral Communications	Study Skills	Resume Writing	Job Application Skills
DESIGN DRAFTING	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
FOOD SERVICES	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*		*	*			*	*	*	*	*	*	*	*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
WELDING	*	*	*			*	*	*	*	*	*	*	*	*	*	*	*	*	*	*

MATHEMATICS SKILLS *****

Listed below are all courses offered at the Ocean County Vocational-Technical School.
The asterisk indicates that the topic is studied in that curriculum.

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
AIR CONDITIONING, REFRIGERATION AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
AUTO BODY REPAIR	*	*	*	*	*	*	*	*	*	*		*
AUTOMOTIVE MECHANICS	*	*	*	*	*	*	*	*	*			*
AUTOMOTIVE AND DIESEL ENGINE REBUILDING	*	*	*	*	*	*	*	*	*	*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*	*	*	*	*	*	*
BUILDING TRADES	*	*	*	*	*	*	*	*	*	*	*	*
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	*		*	*		*			*			*
CHILD CARE AIDE	*	*	*	*	*	*		*	*	*	*	*
COMMERCIAL ART AND PRINTING CAREERS	*	*	*	*	*	*		*	*	*		*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*	*	*	*	*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	*	*	*	*	*	*	*	*	*	*	*	*
CUSTOM CABINETMAKING	*	*	*	*	*	*	*	*	*	*	*	*
DENTAL ASSISTING	*	*	*	*	*	*		*	*			*

MATHEMATICS SKILLS - CONTINUED

COURSE	Whole Numbers	Common Fractions	Decimals	Percentages	Weights and Measurements	Ratio and Proportion	Powers and Roots	Formulas	Estimating	Geometry	Basic Trigonometric Functions	Graphs
DESIGN DRAFTING	*	*	*	*	*	*		*	*	*	*	*
ELECTRICAL TRADES	*	*	*	*	*	*	*	*	*	*	*	*
FASHION MERCHANDISING	*	*	*	*	*	*		*	*	*		*
FOOD SERVICES	*	*	*	*	*	*		*	*	*		*
INDUSTRIAL AUTOMATION AND ELECTRONICS	*	*	*	*	*	*		*	*	*	*	*
INTERIOR DESIGN	*	*	*	*	*	*		*	*	*		*
LANDSCAPING AND GREENHOUSE TECHNOLOGY	*	*	*	*	*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE	*	*	*	*	*	*		*			*	*
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	*	*	*	*	*	*	*	*	*	*		*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*		*	*	*	*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*		*	*	*	*	*
PLUMBING AND HEATING	*	*	*	*	*	*	*	*	*	*	*	*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	*	*	*	*	*	*	*	*			*	*
T.V. AND COMPUTER REPAIR	*	*	*	*	*	*	*	*		*	*	*
WELDING	*	*	*	*	*	*		*	*	*	*	*

21

SCIENCE SKILLS

Listed below are all courses offered at the Ocean County Vocational-Technical School. Those listed as "Not Available" do not offer enough hours to qualify for credits in your high school. However, we have noted the skills covered. Those listed with an asterisk after the title are eligible. The asterisk indicates that the topic is studied in that curriculum.

COURSE	HUMAN ANATOMY						ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology	Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
AIR CONDITIONING, REFRIGERATION AND HEATING							*	*	*	*	*	*		*	*	*				*	*	
AUTO BODY REPAIR								*	*	*	*	*	*	*	*					*		*
AUTOMOTIVE MECHANICS								*		*	*	*	*	*	*	*				*		
AUTOMOTIVE DIESEL AND ENGINE REBUILDING								*		*	*	*		*	*	*	*			*		*
BEAUTY CULTURE I AND II	*	*	*	*	*	*				*	*	*	*		*	*					*	
BUILDING TRADES							*	*	*	*	*	*	*		*	*		*		*		
BUSINESS RELATIONS - MEDIA/MODELING/TRAVEL	N	O	T	A	V	A	I	L	A	B	L	E										
CHILD CARE AIDE	*	*	*	*	*	*			*		*	*		*	*			*	*		*	*
COMMERCIAL ART AND PRINTING CAREERS	N	O	T	A	V	A	I	L	A	B	L	E	*		*	*						*
COMMERCIAL BUILDING CONSTRUCTION (MASONRY)	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*		*		*	*	*
COMMERCIAL PHOTOGRAPHY AND TELEVISION PRODUCTION	N	O	T	A	V	A	I	L	A	B	L	E	*		*	*						*
CUSTOM CABINETMAKING	N	O	T	A	V	A	I	L	A	B	L	E			*			*				
DENTAL ASSISTING	*	*	*	*	*	*				*	*	*	*								*	*

SCIENCE SKILLS - CONTINUED

COURSE	HUMAN ANATOMY							ASTRONOMY			CHEMISTRY			PHYSICS					ECOLOGY				
	Cellular Theory	Skeletal System	Muscles	System of Body	Diseases	Psychology		Solar System	Gravity	Weather	Matter	Chemical Reactions	Applied Chemistry	Light	Magnetism	Heat	Magnetism and Electricity	Nuclear Energy	Botany	Food Production	Fuels	Nutrition	Waste Disposal
DESIGN DRAFTING								*	*	*	*		*	*		*	*	*			*		*
ELECTRICAL TRADES								*	*	*	*	*		*	*	*	*	*		*			
FASHION MERCHANDISING	*	*	*	*		*			*		*	*	*	*								*	
FOOD SERVICES					*	*			*	*		*	*	*		*				*		*	*
INDUSTRIAL AUTOMATION AND ELECTRONICS									*		*			*	*	*	*	*			*		
INTERIOR DESIGN		*	*			*		*	*	*	*	*	*	*		*	*						
LANDSCAPING AND GREENHOUSE TECHNOLOGY								*	*	*		*	*	*		*	*		*	*	*	*	*
MARINE ENGINE AND BOAT SERVICE									*	*	*	*	*	*	*	*	*		*		*		
MEDICAL OFFICE RECEPTIONIST/ASSISTANT	N	O	T	A	V	A		I	L	A	B	L	E										*
MEDICAL SKILLS AND RELATED HEALTH CAREERS	*	*	*	*	*	*			*		*	*					*			*		*	*
MEDICAL SKILLS (ADVANCED)	*	*	*	*	*	*			*		*	*					*			*		*	*
PLUMBING AND HEATING					*			*	*	*	*	*	*			*	*		*		*		*
RECREATIONAL VEHICLE MAINTENANCE AND REPAIR	N	O	T	A	V	A		I	L	A	B	L	E	*	*	*	*				*		*
T.V. AND COMPUTER REPAIR											*	*	*	*	*	*	*				*		
WELDING									*		*	*	*	*	*	*	*				*		

COURSE OBJECTIVES

1. To prepare students with entry level skills, abilities and knowledge for employment in the recreational vehicle trades.
2. To present 900 hours of instruction and practice in the recreational vehicle trades in accordance with the course curriculum and skill profile outline.
3. To provide a detailed summary evaluation of the proficiency achieved by each student representing the most important content areas presented in the recreational vehicle maintenance and repair skill profile.
4. To help each student develop positive attitudes and ideals related to their occupation in the recreational vehicle trades and understand their own capabilities and potential.
5. To instill in each student the need to plan for their professional growth through continuous learning in their chosen occupation.

STUDENT ACTIVITIES

All students enrolled in the Ocean County Vocational-Technical School are encouraged to join Vocational Industrial Clubs of America (VICA). Student activities are infused into each program. Each building has a student government and a student activities program separate from VICA. Additionally, students from each center and every class are encouraged to participate in the VICA Leadership and Job Demonstration Contests which begin in the centers and radiate throughout the district as Ocean County Vocational-Technical School inter school winners are chosen.

Student activities emphasize the basic precepts of VICA, as well as the basic tenets of democracy. Within the context, each of our programs teaches the dignity of work, high standards in trade ethics and safety, and a belief in the free enterprise economic system.

5 11
2 1

TABLE OF CONTENTS

RECREATIONAL VEHICLE MAINTENANCE AND REPAIR

PHILOSOPHY OF EDUCATION.....	i
PREFACE.....	ii
POTENTIAL OPPORTUNITY FOR AWARDING ACADEMIC CREDITS.....	iii
COMMUNICATION SKILLS.....	vi
MATHEMATICS SKILLS.....	viii
SCIENCE SKILLS.....	x
COURSE OBJECTIVES.....	xii
STUDENT ACTIVITIES.....	xiii
ORIENTATION.....	1
TOOLS.....	3
Hand and Power Tools.....	3
FASTENERS.....	4
MEASUREMENT.....	5
SHOP MANUALS.....	6
THE ENGINE.....	7
Engine Operation.....	7
Engine Measurement.....	8
Engine Types.....	9
Engine Construction.....	10
CRANKSHAFT AND BEARINGS.....	11
PISTONS AND CONNECTING RODS.....	12
VALVES AND VALVE TRAIN.....	13

LUBRICATION SYSTEM.....	14
FUEL SYSTEM.....	15
COOLING SYSTEM.....	16
GASOLINE.....	17
ELECTRICAL SYSTEM.....	18
BATTERY.....	19
STARTING SYSTEM.....	20
CHARGING SYSTEM.....	21
IGNITION SYSTEM.....	22
DRIVE TRAIN.....	23
DRIVE LINE.....	24
DIFFERENTIALS.....	25
SUSPENSION.....	26
STEERING SYSTEMS.....	27
BRAKE SYSTEM.....	28
TIRES AND WHEELS.....	29
HEATING AND AIR CONDITIONING.....	30
EMISSION CONTROLS.....	31
WELDING.....	32
Gas Welding.....	32
Arc Welding.....	33

UNIT: ORIENTATION

Page 1

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. School rules and regulations	A. Student rights and responsibilities B. Student grievance procedures C. Student expectations D. School code of discipline E. Attendance and graduation policy F. Student transfers G. Grading system H. Accidents I. Bedside instruction J. Cooperative Industrial Education (C.I.E.) K. Driving policy L. Drug and alcohol policy M. Early dismissal procedures N. Lockers O. Driver permits P. School closing procedures Q. Smoking R. Student progress reports S. Telephones T. Theft U. Tools and equipment V. Vocational Industrial Clubs of America (VICA)	A. Note taking B. Filling out forms C. Oral communication D. Test taking skills E. Functional reading skills (Student Handbook)			A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions Written test B. The student will know the standards to be met within the school and classroom Written test

UNIT: ORIENTATION - CONTINUED

Page 2

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
II. Student contract	A. Attendance B. Request for make-up work C. Extra help with assignments or lessons D. Homework assignments E. Notebooks F. Passing test grade G. Daily grading system H. Lockers I. Dress code J. Daily cleaning duties	A. Functional reading skills B. Following directions C. Outlining and note taking D. Oral communications			A. The student will know what is expected of him/her for the school year in order to promote effective learning conditions Written test B. The student will know the standards to be met within the school and classroom Written test

UNIT: TOOLS

Page 3

TOPIC: HAND AND POWER TOOLS

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Utilizing shop hand tools	A. Description of hand tools used in the shop B. Safety precautions C. Do's and don'ts D. Rights and wrongs E. Standard F. Metric	A. Functional reading skills B. Vocabulary C. Following directions D. Identifying main ideas E. Meanings in context F. Inferences G. Oral communications	A. Whole numbers B. Fractions C. Decimals D. Ratio E. Rule graduations	A. Energy B. Force C. Physics D. Magnetism	A. The student will be able to identify various hand tools B. The student will be able to describe hand tools C. The student will be able to explain the correct way to use hand tools D. The student will be able to name the various types of hand tools E. The student will be able to perform with hand tools F. The student will be able to repair hand tools
II. Utilizing shop power tools	A. Description of shop power tools 1. Electrical 2. Compressed air 3. Hydraulic pressure B. Safety precautions C. Do's and don'ts D. Rights and wrongs	A. Functional reading skills B. Vocabulary C. Following directions D. Identifying main ideas E. Meanings in context F. Inferences G. Oral communications	A. Weights and measurements B. Ratio	A. Energy B. Gravity C. Physics D. Solvents E. Cleaning agents	A. The student will be able to identify various power tools B. The student will be able to describe the cautions of power tools C. The student will be able to explain the purpose of power tools D. The student will be able to name the types of motion E. The student will be able to perform with power tools F. The student will be able to repair power tools

UNIT: FASTENERS

Page 4

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Utilizing fasteners	A. Describe the fasteners used in the mechanics' field B. How to use fasteners C. Various types of fasteners 1. Nuts 2. Screws 3. Bolts 4. Stud 5. Washer 6. Snap rings 7. Key and key-way 8. Spline 9. Rivet 10. Set screw 11. Self-tapping 12. Speed nut 13. Self-locking 14. Threaded insert	A. Functional reading skills B. Vocabulary C. Oral communications D. Outlining and note taking E. Classifications D. Series 1. Coarse 2. Fine 3. Extra fine E. Head markings F. Application G. Test taking skills	A. Pitch - threads per inch B. VSC system C. Metric system	A. Tensile strength B. Material C. Quality	A. The student will be able to discuss screw threads B. The student will be able to explain pitch, series and classes of fasteners C. The student will be able to identify various markings to indicate strength D. The student will be able to list and describe various types of fasteners E. The student will be able to demonstrate the use of fasteners with the correct tools

UNIT: MEASUREMENT

Page 5

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Measuring	A. Two systems of measurement 1. USCS 2. Metric B. Importance	A. Functional reading skills B. Vocabulary C. Outlining and note taking D. Oral communications E. Test taking skills	A. USCS B. Metric system 1. Meter 2. Kilometer 3. Kilogram 4. Centimeter 5. Milometer 6. Liter C. Conversion tables 1. Length 2. Volume D. Linear measurement E. Decimal reading into fractions		A. The student will be able to describe the two basic systems of measurement B. The student will be able to list basic units of measurement in inch system C. The student will be able to explain how to convert measurements from one system to the other system D. The student will be able to record (specs), perform measurement, compare measurement and make adjustments E. The student will be able to demonstrate using feeler gauges, micrometer, dial indicator, vernier caliper and depth and hole gauges

UNIT: SHOP MANUALS

Page 6

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Utilizing shop manuals	A. Explanation and description of the various sources of mechanic service information and specification B. Six steps in any service job as a mechanic - Measuring - Disassembly - Machining - Installing - Reassembly - Adjustment	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Signal words H. Test taking skills	A. Measurements B. Machining specifications		A. The student will be able to list the six steps in any service job as a mechanic B. The student will be able to explain various sources of information C. The student will be able to describe and record specifications before starting service D. The student will be able to produce a job sheet with step-by-step procedures highlighting the following - Note - Cautions

UNIT: THE ENGINE

Page 7

TOPIC: ENGINE OPERATION

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analyzing engine operation	A. Introduction to the construction and operation of the internal combustion engine B. Description and explanation of the fundamentals inside the engine	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Signal words H. Fact/Opinion distinction I. Manuals J. Test taking skills	Formulas for the following 1. Piston displacement 2. Cylinder bore 3. Compression ratio 4. Port size 5. cc heads 6. Cutting valve angles and degrees 7. Valve train geometry 8. Gear and chain drive 9. Cycle sequence 10. Work in feet and pounds 11. Firing order	Formulas for the following 1. Gravity 2. Atmospheric pressure 3. Vacuum 4. Heat 5. Rotary motion 6. Reciprocating motion 7. The four strokes 8. Air - fuel mixture 9. Compression 10. B.D.C. and T.D.C. 11. Work against force 12. Volumetric efficiency 13. Torque 14. Friction and brake horsepower 15. Expanding force 16. Explosion	A. The student will be able to explain various ways engines are classified B. The student will be able to describe reciprocating motion C. The student will be able to identify various valve arrangements D. The student will be able to demonstrate how the four cycle engine works E. The student will be able to perform dead timing F. The student will be able to calculate piston displacement G. The student will be able to calculate compression ratio

UNIT: THE ENGINE - CONTINUED

Page 8

TOPIC: ENGINE MEASUREMENT

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Taking engine measurement	A. Explanation of the different ways engines are measured B. Description of piston displacement C. Two ways to measure 1. Physical 2. Performance D. The bore and stroke of an engine 1. T.D.C. 2. B.P.C.	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Spelling G. Test taking skills	A. Bore is diameter B. Oversquare - greater than C. Volume D. Compression ratio E. Feet, pounds and metric F. Torque G. Horsepower H. Calculation	A. Engine efficiency B. Atmospheric pressure C. Fuel	A. The student will be able to explain what bore and stroke means B. The student will be able to explain piston displacement C. The student will be able to explain how it is calculated D. The student will be able to explain compression ratio

UNIT: THE ENGINE - CONTINUED

Page 9

TOPIC: ENGINE TYPES

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
1. Analyzing engine types	A. Discription and review of various types of engines B. Explanation of classification 1. Number and arrangement 2. Arrangement of valves 3. Types of cooling	A. Functional reading skills B. Vocabulary C. Oral communications D. Writing skills E. Outlining and note taking	A. Bore is diameter B. Oversquare - greater than C. Volume D. Compression ratio E. Feet, pounds and metric F. Torque G. Horsepower H. Calculation	A. Cooling system B. Fuel injection C. Water jackets	A. The student will be able to explain the various ways to identify an engine B. The student will be able to describe various cylinder arrangement C. The student will be able to describe the types of valve systems D. The student will be able to explain the firmino order

UNIT: THE ENGINE - CONTINUED

Page 10

TOPIC: ENGINE CONSTRUCTION

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analyzing engine construction	A. Explanation of cylinder block B. Description of cylinder head C. Review 1. Molding 2. Machining work D. Review 1. Intake system 2. Exhaust system	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Spelling G. Demonstrations H. Cutaways identification	A. Machine surface B. Tapped hold size	A. Molding and casting B. Heat C. Gasket compounds D. Aluminum, steel and cast iron E. Metal	A. The student will be able to explain how an engine is manufactured B. The student will be able to describe the machining process C. The student will be able to describe water jackets D. The student will be able to explain the reason for gaskets and the types of gaskets E. The student will be able to explain the intake system and exhaust system

UNIT: CRANKSHAFT AND BEARINGS

Page 11

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of crankshaft and bearings	Explanation of the engine 1. Crankshaft 2. Bearings a. flywheel b. vibration damper c. counter weight	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas	A. Crank size B. Bearing size C. Firing order D. Oil clearance E. Torque F. Counter weight	A. Harmonic balancer B. Torsional vibration C. Vibration	A. The student will be able to describe typical crank B. The student will be able to explain the balance process C. The student will be able to describe the vibration damper D. The student will be able to explain the purpose of engine bearings

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of pistons and connecting rods	A. Purpose of pistons and rods B. Construction C. Types 1. Pistons 2. Rods 3. Bearings 4. Rings D. Bearing lubrication E. Types of rings	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills	A. Press fit B. Piston size C. Clearances D. Stroke of piston E. Offset	A. Fuel B. Oil control C. Types of metals D. Expansion E. Contraction	A. The student will be able to explain the purpose and construction of pistons and connecting rods B. The student will be able to explain and demonstrate how parts are connected C. The student will be able to describe how expansion is controlled D. The student will be able to explain how rings work

UNIT: VALVES AND VALVE TRAIN

Page 13

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
1. Analysis of valves and valve train	A. Description of valve train B. Discuss types and how they are driven C. Review timing D. Describe and demonstrate valve train E. Review lifters, rockers and push rods	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills	A. Ratio B. Lift cam and duration C. Calculation of valve size and cam size D. Cutting valve face, stems and seats E. Clearance F. Timing G. Degrees	A. Valve overlap B. Valve heat C. Rotation and slide	A. The student will be able to explain the construction and operation of valve train B. The student will be able to describe types of arrangements C. The student will be able to demonstrate firing order in sequence with valves

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the lubrication system	A. Review engine lubrication system and parts B. Describe types of lubrication C. Discuss how lubrication oil gets to parts D. Demonstration of lubrication 1. Thickness 2. Application E. Oil additives F. Describe press indicators	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Spelling H. Demonstration	A. Multiple viscosity B. Pound and pressure C. Weight of lubrication D. Multigrade E. Chemical number	A. Viscosity B. Oil cooler C. Pour point D. Inhibitor E. Detergent F. Dispersant G. Synthetic	A. The student will be able to explain how oil is produced B. The student will be able to describe ways oil is rated - SAE C. The student will be able to describe the various additives and their purpose D. The student will be able to explain oil circulation E. The student will be able to describe and list the components in the lubrication system F. The student will be able to explain the importance of oil G. The student will be able to describe the pro's and con's of kinds of oil and weather conditions H. The student will be able to discuss synthetic oil and the price I. The student will be able to discuss various types of oil coolers and filters

UNIT: FUEL SYSTEM

Page 15

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the fuel system	A. Describe the carburetor system - Float system - Idle - Main - Power - Accelerator - Choke B. Carburetor function C. Various types of carburetors D. Component parts - Fuel pump - Filter - Air cleaner - Sensors - Vapor lines E. Carburetor diagnosis and repair F. Overhaul of carburetor G. Multi-carburetor synchronization	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Demonstration H. Writing skills I. Films J. Handouts K. Cutaways	A. Manual specifications B. Adjustment screws C. Float adjustment D. Fuel - air ratio E. Carburetor sizes F. Jet sizes G. Mileage per gallon H. Analyzed specifications I. Carburetor synchronization	A. Vaporization B. Vapor lock C. Atmospheric pressure D. Sea level versus mountains E. Venturi F. Air - fuel ratio G. Manifold heat H. Cooling fuel I. Control devices J. Vacuum	A. The student will be able to explain how a carburetor works B. The student will be able to list and explain each carburetor system C. The student will be able to adjust a carburetor to manufacturer specifications D. The student will be able to adjust a carburetor for inspection E. The student will be able to describe component parts and their purpose F. The student will be able to describe the venturi constriction operation G. The student will be able to troubleshoot, service, repair and rebuild a carburetor

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the cooling system	A. Cover construction and operation of a cooling system B. Various types of cooling systems C. Heat development D. Overheating E. Different ways heat is removed F. Overcooling G. Review water, anti-freeze and pressure cap H. Cross flow, down flow, expansion tanks and heaters I. Liquid and air cooling	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Demonstration	A. Displacement for cooling B. Pressure pounds C. Temperature D. Thermostat E. Measuring	A. Mixing B. Ratio C. Radiating D. Solution	A. The student will be able to describe the purpose of the cooling system and how it works B. The student will be able to explain how the water pump and thermostat work C. The student will be able to describe the construction and various parts D. The student will be able to explain pressurizing E. The student will be able to describe coolant and its composition

UNIT: GASOLINE

TOPIC:

Page 17

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of gasoline	A. Gasoline - What it is - How it works in the engine B. Characteristics of good gas C. Review the crude oil refining process D. Combustion E. Detonation F. Pre-ignition G. Octane in an engine H. H.C. and C.O.	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Demonstration H. Report I. Films J. Handouts	A. Ratio B. Rating C. Reading analyzer D. Corrections to specifications	A. Volatility B. Heat C. Detonation D. Additives E. Process F. Vaporize G. Oxidation H. Lead	A. The student will be able to describe the composition of gas B. The student will be able to discuss the crude oil process C. The student will be able to describe the additives that are mixed and why D. The student will be able to explain volatility and how it effects engine operation E. The student will be able to explain lead and unleaded gasoline F. The student will be able to explain the relationship between compression ratio and detonation G. The student will be able to explain the reasons for pre-ignition

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analyzing the electrical system	A. Electricity and electronics B. The many jobs of the electrical system C. One wide systems D. Alternator current E. Direct current F. Diode and transistors G. Circuits	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Signal words H. Spelling I. Fact/Opinion distinction J. Interpretation of diagrams K. Problem solving L. Outside report	A. Measuring current B. Testing high and low voltage C. Measuring resistance in ohms	A. Magnets B. Lines of force C. Electromagnets demonstration D. Ohms law	A. The student will be able to discuss electricity, electric current and current in terms of electron movement B. The student will be able to explain how magnets work and what lines of force are C. The student will be able to list the various electronic devices now used in the mechanic field

UNIT: BATTERY

Page 19

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
1. Analysis of the battery	A. Construction and operation B. Battery testing C. Battery service D. Battery safety E. Six and twelve volt systems F. Related terms 1. Resistance 2. Current 3. Voltage 4. Insulation 5. Conduction	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Student demonstration	A. High discharge testing B. Load testing C. Hydrometer readings	A. Lead - acid units B. Producing electrical current by chemical means	The student will be able to perform battery service 1. Testing 2. Charging 3. Jumping 4. Replacing

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the starting system	A. Construction and operation of the starting system B. Troubleshooting and servicing of starting motors C. Identify various types of starting motors and their operation D. Testing field type E. Testing using sun VAT 40	A. Functional reading skills B. Vocabulary 1. Armature 2. Brushes 3. Commutation 4. Solenoid C. Oral communications D. Following directions E. Outlining and note taking F. Signal words G. Wiring circuit	A. Armature gear ratio B. Ring gear ratio C. Starter R.P.M. D. Crankshaft R.P.M. calculation	A. Magnetic poles 1. Attract 2. Repel B. Producing magnetic field C. Current flow	A. The student will be able to describe the operation of a starting motor B. The student will be able to explain how a starting motor works C. The student will be able to list the possible causes of a troubled starter D. The student will be able to perform starter service and repair E. The student will be able to install a new starter F. The student will be able to troubleshoot a starting problem G. The student will be able to replace and/or service solenoid

UNIT: CHARGING SYSTEM

Page 21

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the charging system	A. Discuss - Generators - Alternators - Regulators B. Conversion of alternator current to direct current C. Principles and construction D. Various types and identification	A. Functional reading skills B. Vocabulary - Rectifier - Armature - Commutation - Solid state - Stator - Rotor - Diode C. Oral communications D. Following directions E. Outlining and note taking F. Reading circuits	A. Current induced B. Various electric valves C. Charging rates	A. Magnetic field B. Alternator principles	A. The student will be able to describe the difference between the generator and the alternator B. The student will be able to explain the charging system operation C. The student will be able to explain the purpose of regulators D. The student will be able to perform replacement of parts in the charging system E. The student will be able to perform polarizing of the charging system and components F. The student will be able to troubleshoot the charging system - Field test - Shop test

UNIT: IGNITION SYSTEM

Page 72

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the ignition system	A. Discuss the ignition, the different components and how they all work together B. Action 1. Primary 2. Secondary C. Distributor cap and rotor D. Point system E. High-energy system F. Ignition timing G. Replace parts and set specifications in vehicle H. Set distributor up on sun machine	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Service manuals G. Specification sheets H. Task sheets I. Interpretation of wiring diagrams J. Student demonstrations K. Student project teaching aid	A. Voltage B. Amp's C. Primary and secondary output D. Centrifugal advance degrees	A. Point field collapses B. Vacuum advance C. Mechanical advance D. Centrifugal advance E. Reluctor pick up F. Voltage surge	A. The student will be able to explain the purpose of the ignition system B. The student will be able to describe the components in the ignition system C. The student will be able to describe the two circuits and explain how they work D. The student will be able to identify and explain the point system and electronic system E. The student will be able to explain the purpose of centrifugal and vacuum advance mechanisms and how they work F. The student will be able to perform service and repair on both systems G. The student will be able to troubleshoot both types of ignition systems

UNIT: DRIVE TRAIN

Page 23

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of drive trains	A. Describe the construction, operation and troubleshooting of various drive trains 1. Manual 2. Automatic B. Identify 1. Primary gears 2. Secondary gears 3. Final drives C. Discuss various types and styles of clutch mechanisms D. Explain linkages operation	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Service manuals G. Cutaways H. Student projects I. Demonstrations	A. Gear ratio B. Size clutches C. Plate pressure D. Release travel E. Synchronization F. Overdrive G. Spur gear ratio	A. Power flow B. Fluids C. Friction D. Resistance E. Torque	A. The student will be able to explain the purpose of construction and operation of clutching B. The student will be able to discuss clutch troubles and their possible causes C. The student will be able to service and repair both manual and hydraulic clutches D. The student will be able to troubleshoot clutch problems and adjust linkage E. The student will be able to explain how synchronizers work F. The student will be able to discuss transmission troubles and possible causes G. The student will be able to identify various fluid requirements H. The student will be able to replace and/or repair the transmission and linkage

UNIT: DRIVE LINE

Page 24

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of drive line	A. Discuss the purpose, construction and operation of the drive line and component parts B. Explanation of operation 1. Drive shafts 2. Propeller shafts 3. Universal joints 4. Slip joints 5. Carrier bearing 6. C.V. joints 7. Splines C. Identifying types 1. Front engine bear drive 2. Front wheel drive 3. Four-wheel drive 4. Gears and chains	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Signal words G. Writing skills H. Spelling I. Identifying main ideas J. Film K. Manuals L. Tasks M. Projects N. Demonstrations	A. Gear ratio B. Fractions C. Percentages D. Measurements E. Changing lengths F. Angle of drive G. Speed fluctuations	A. Transfer of engine's power to wheels B. Force of tuning C. Torque D. C.V. joint	A. The student will be able to explain the construction and operation of the drive line B. The student will be able to troubleshoot a drive line, identify the problem and estimate the time and cost C. The student will be able to service and repair various types of drive line D. The student will be able to discuss troubles and possible causes of drive line E. The student will be able to perform lubrication requirements

UNIT: DIFFERENTIALS

Page 25

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of differentials	A. Covers the construction and operation of differential drive axles B. Identify 1. Single drive 2. Slip clutch type 3. Lock out 4. Live axle C. Explain wheel travel in turns D. Discuss power flow and gear direction E. Diagnosing problems F. Service, replace and repair of differentials	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Signal words G. Writing skills H. Spelling I. Film J. Manuals K. Tasks L. Projects M. Demonstrations	A. The difference in wheel travel as vehicle makes a 90° turn and radius B. Gear ratio C. Whole numbers D. Tire size E. Mileage	A. Physics B. Rotary motion C. Torque D. Turning effect E. Power flow F. Pressure	A. The student will be able to discuss the purpose, construction and operation of a differential B. The student will be able to explain how various types of differentials work C. The student will be able to discuss troubles and possible causes D. The student will be able to diagnose differential troubles E. The student will be able to perform adjustments F. The student will be able to service lubrication required G. The student will be able to identify noise trouble

UNIT: SUSPENSION

Page 26

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of the suspension system	A. Springs and suspension of front and rear B. Describe various types used C. Explain how they work D. Discuss the purpose and operation E. Identify and state the function - Types of springs - Shocks and struts - Frame mounts - Control arms - Ball joints - Rod ends - Spindle - Stabilizer - MacPherson - Suspension service F. Describe alignment	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills G. Spelling H. Films I. Demonstration J. Teacher aides K. Task L. Trade talk	A. Whole numbers B. Frame travel C. Weights and measurements	A. Spring rate B. Torsion twist C. Forward and backward D. Stabilizer bar compress and expand E. Weight transfer F. Body roll	A. The student will be able to explain the purpose of suspension of the front and rear B. The student will be able to describe various types of suspension systems C. The student will be able to describe how various suspension systems work D. The student will be able to describe how suspension systems are attached E. The student will be able to identify the type of suspension system and list the parts F. The student will be able to service and repair defective components G. The student will be able to troubleshoot and make connection H. The student will be able to perform alignment to the manufacturer's specifications

UNIT: STEERING SYSTEMS

Page 27

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of steering systems	A. Steering systems 1. Manual steering 2. Power steering 3. Rack and pinion 4. Leg profile B. Explain the different front end angles C. Discuss front end geometry D. Identify various steering gears E. Explain wheel alignment procedures check list	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills G. Spelling H. Trade talk I. Report J. Films K. Demonstration	A. Front end geometry B. Camber C. Axis inclination D. Caster E. Toe in F. Toe out G. Turning radius H. Degrees from vertical angle I. Positive and negative angle J. Fractions of an inch	A. Push and pull force B. Weight force C. Load and rolling force D. Steering stability E. Wheel trails of forward push F. Fluid pressure G. Bump steer H. Wheel runout I. Static balance J. Dynamic balance	A. The student will be able to identify various types of steering systems B. The student will be able to explain the construction, purpose and operation of each steering system C. The student will be able to record manufacturers' specifications, compare and make adjustments D. The student will be able to service and repair steering systems E. The student will be able to perform a front end safety check F. The student will be able to troubleshoot steering problems G. The student will be able to service a power steering pump H. The student will be able to perform wheel alignment to specifications

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of brake system	A. Construction and operation of the brake system 1. Drum 2. Manual and power 3. Cable and linkage B. Explain the purpose of each system C. Describe the difference between systems D. Identify various master and wheel cylinders E. Identify various calipers F. Explain types of brake lines G. Describe the job of the proportioning valve H. Identify stop light switches	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills G. Spelling H. Trade talk I. Film J. Performance tasks K. Demonstrations L. Teaching aids M. Handouts N. Manufacturers' specifications	A. Whole numbers B. Fractions C. Manufacturers' specifications D. Measurements E. Micrometer F. Dial indicator	A. Force B. Weight C. Friction D. Pressure E. Self adjuster F. Fluid G. Vacuum H. Beat	A. The student will be able to explain how a brake system works B. The student will be able to identify various types of systems used today C. The student will be able to perform a brake safety check D. The student will be able to service and repair a brake system E. The student will be able to troubleshoot a brake system F. The student will be able to describe in detail various possible brake troubles and causes G. The student will be able to service emergency brake system H. The student will be able to service master cylinder and wheel cylinder I. The student will be able to repair or replace rotor and/or caliper J. The student will be able to read the manufacturer's specifications

UNIT: TIRES AND WHEELS

Page 79

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of tires and wheels	A. Describe tire and tube construction B. Identify tires - Bias - Radial - Racing tires - Off road C. Tire service - Inspection - Removal - Repair - Replace tires - Tire correct psi - Tire rotation D. Purpose of tire compound E. Identify space saver tires F. Tire wear and possible causes G. Tube and tubeless tires H. How to read tire size I. Wheel balancing	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Identifying main ideas G. Writing skills H. Spelling I. Trade talk J. Handout K. Tasks L. Demonstration	A. Whole numbers B. Fractions C. Weights and measurements	A. Tire pressure B. Tire compound - Cool patch - Heat patch C. Friction D. Rotation E. Scuffing	A. The student will be able to identify various types of tires and record their make, size and compound B. The student will be able to describe various kinds of tire service and the purpose of construction C. The student will be able to perform tire service D. The student will be able to perform tire and rim change E. The student will be able to perform tire balancing - Static type - Speed type F. The student will be able to repair tube and tubeless tires G. The student will be able to service rim, replace valve and check for leaks

UNIT: HEATING AND AIR CONDITIONING

Page 30

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of heating and air conditioning systems	A. Construction and operation of heating, air and defrost systems B. Describe various types and styles C. Explain how each system works D. Describe how various valves and components operate together E. Describe various sensors operation F. Identify types of thermostats G. Explain fan motion H. Describe air conditioning components and how they work	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills G. Spelling H. Film I. Demonstrations J. Teaching aids K. Performance tasks L. Service manuals	A. Whole numbers B. Fractions C. Decimals D. Ratio	A. Temperature 1. Hot 2. Cold B. Vacuum C. Vapor and gas D. Compression E. Recirculate F. Evaporation G. Pressure	A. The student will be able to explain how heating and air conditioning works B. The student will be able to discuss various types and identify each C. The student will be able to service and repair heating system procedures D. The student will be able to troubleshoot 1. Control valves 2. Sensors 3. Electrical 4. Vacuum E. The student will be able to explain the job of each air conditioning component and check each for leaks F. The student will be able to troubleshoot the air conditioning test system and identify the trouble G. The student will be able to perform the evacuation and charging of the air conditioning system H. The student will be able to service the compressor using gauges

UNIT: EMISSION CONTROLS

Page 31

TOPIC:

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of emission controls	A. Why emission controls are needed B. Various control devices C. How each works 1. P.C.V. system 2. Evaporating 3. Exhaust 4. Catalytic D. Dangers from smog and pollution E. How emission control can help or hinder performance F. Explain New Jersey State Inspection G. Describe EGM system	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Writing skills G. Spelling H. Film I. Teaching aids J. Tasks K. Service manuals	A. Manufacturers' specifications B. Whole numbers C. Percentages	A. Combustion B. Pollution C. Hydrocarbon (HC) D. Water (H ₂ O) E. Carbon dioxide (CO ₂) F. Nitrogen oxides (NO _x) G. Vapors H. Atmosphere I. Gravity	A. The student will be able to describe how to service the various emission control devices B. The student will be able to identify various systems C. The student will be able to record, check specifications and make adjustments D. The student will be able to troubleshoot each system and check operation E. The student will be able to service and repair worn or defective parts F. The student will be able to perform New Jersey State inspection check list G. The student will be able to make adjustments to state specifications

UNIT: WELDING

Page 32

TOPIC: GAS WELDING

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
1. Analysis of gas welding	A. Welding - Gas welding - Electric welding - Torch cutting B. Safety procedures and set up C. Types of flames D. Light up and shut down procedure E. Welding tasks - Filler rod - Brazing - Fusing	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Handout G. Safety film H. Demonstration I. Tasks	A. Ratio of fuel - gas to oxygen B. Angular measurements	A. Fuel B. Acetylene C. Heat energy D. Expansion E. Heat transfer F. Change of state in solids	A. The student will be able to recognize safety hazards B. The student will be able to identify damaged equipment C. The student will be able to select proper nozzle D. The student will be able to properly set gauges E. The student will be able to safely conduct the light up and shut down procedure F. The student will be able to perform welding tasks

UNIT: WELDING - CONTINUED

Page 33

TOPIC: ARC WELDING

Task	Theory	Communication Skills	Mathematics Skills	Science Knowledge	Student Outcome
I. Analysis of arc welding	A. Safety procedures B. Elements of process C. Advantages D. Various types of rods	A. Functional reading skills B. Vocabulary C. Oral communications D. Following directions E. Outlining and note taking F. Handouts G. Safety film H. Demonstration I. Tasks	A. Basic whole numbers B. Fractional computation	A. Polarity B. Current C. Voltage	A. The student will be able to properly set up and operate arc welding B. The student will be able to identify various metals and choose correct rod C. The student will be able to perform welding task and check for defects